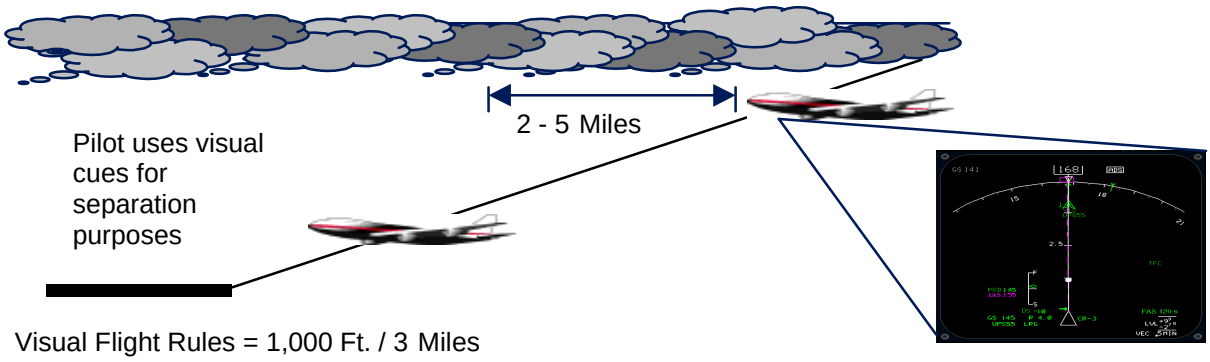
AW-2: Space Closer to Visual Standards

Using cockpit tools and displays to achieve VMC throughput capacity in all weather conditions.



Background

Most airports have established weather minima below which visual approaches cannot be conducted, primarily due to the difficulty for the pilot to visually acquire the runway or traffic in such weather. Currently, the requirement for visual approaches is ceiling 500 feet above minimum vectoring altitude and visibility 3 miles.. However, other environmental conditions such as haze, sunlight, smoke, and patchy clouds may effectively prohibit visual approaches at higher ceiling and visibility values. Without a cockpit tool that provides situational awareness of the leading aircraft, it is difficult for the pilot to acquire and maintain visual acquisition of the leading aircraft in marginal VMC.

Ops Change Description

The primary objective of this operational change is to help the pilot, through the use of the Cockpit Display of Traffic Information (CDTI), visually acquire and identify an aircraft that has been referenced as traffic by ATC, so the controller may clear the aircraft for a visual approach. The CDTI will enable quicker identification since the pilot will be able to correlate the target aircraft and trajectory information from the CDTI to the actual traffic as seen out-the-window. With quicker identification of pertinent traffic, the need for additional traffic advisories or follow-on interactions between the pilot and controller should be reduced. Another objective is to better enable the pilot to obtain and maintain visual separation once it is initially established.

The primary advantage of this application is that the pilot of an Automatic Dependent Surveillance – Broadcast (ADS-B)/CDTI aircraft will be better able to isolate the traffic to be acquired on the CDTI when the other aircraft is also ADS-B equipped. This advantage is made possible by features on the CDTI which display the call sign of other aircraft. This should permit even shorter visual acquisition times and greater pilot and controller confidence that the pilot has identified the correct aircraft. Consequently, this should result in lower pilot and controller workload and reduced communication burden. In addition, it is anticipated that this will result in the ability to continue visual approaches into marginal VMC. For example, as mentioned earlier, the ceiling requirement for visual approaches is 500 feet above minimum vectoring altitude and

visibility 3 miles. With CDTI, the 500 feet criteria could be lowered. Also, since visual acquisition will be enhanced, visual conditions will be able to be maintained in marginal conditions for a longer period of time.[1]

Additional operational applications will be explored for the use of "Along Track Separation" to maintain closer spacing during the approach phase to parallel runways separated by less than 2500 feet. Potential reduction in dependent runway distances will be assessed using data from ongoing wake vortex research. Also, research addressing human factors, roles and responsibilities, and certification issues for the proposed longer-term spacing applications in IMC will be conducted during the OEP time frame.

Benefits, Performance and Metrics

- Increase airport percent effectiveness on the order of 1 to 5 percent for arrival throughput in VMC.
- Increase airport percent effectiveness for arrival throughput in deteriorating VMC.
- Reduction in en route delay resulting from better flows into airports.

Scope and Applicability

- Benefits for the enhanced visual acquisition/situation awareness are dependent upon the degree to which visual acquisition is extended into marginal VMC. This will vary from airport to airport.
- Along Track Separation applications will be assessed by 2004.
- Potential procedural changes based on ongoing wake vortex data collection and analysis will be examined by 2003.

Key Decisions

- Equipage to a level that will provide benefits based on these and other committed applications.
- ADS-B data link (i.e., Mode S, Universal Access Transceiver, and/or VDL-4) decision will impact cost, interoperability, and community participation.
- Safety assessment of potential parallel runway dependency changes based on wake vortex data.

Key Risks

- Pilot acceptance of new application of visual acquisition enhancements.
- Controller acceptance of new phraseology required for visual acquisition enhancements.

[1] Although we use ADS-B in the description, we do recognize that position information may come from multiple sources/mechanisms.